

Reuse of lignocellulosic materials as cells immobilization carrier during the fructooligosaccharides and beta-fructofuranosidase production

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Fructooligosaccharides (FOS) are fructose oligomers produced on industrial scale from the disaccharide sucrose by microbial enzymes having transfructosylating activity (beta-fructofuranosidase - FFase - EC 3.2.1.26). The FOS production yields by this process are normally low (55% to 60%) since the enzymes involved in the reaction have, besides the transfructosylation activity, hydrolytic activity giving glucose and fructose as reaction by-products. Therefore, several studies have been performed aiming to improve the FOS production yield. Most of them were focused on finding new species of microorganisms able to produce enzymes with high FFase activities. A possible alternative that has been few explored for FOS production is the use of immobilized cells. However, the correct selection of immobilization support is essential to design an effective system. The present work evaluated the FOS and FFase production by *Aspergillus japonicus* (ATCC 20236) cells immobilized in different lignocellulosic material wastes: brewer's spent grain, cork oak and loofa sponge. The assays were performed in 500 ml Erlenmeyer flasks containing 1 g of support and 100 ml of culture medium with the following composition (% w/v): sucrose 20, yeast extract 2.75, NaNO₃ 0.2, K₂HPO₄ 0.5, MgSO₄·7H₂O 0.05, and KCl 0.05. Transfructosylating (U_t) and hydrolyzing (U_h) activities of FFase were also determined. Brewer's spent grain was the best carrier material since gave the highest results of microorganism immobilization (1.06 g/g support after 48 h), FOS productivity (5.39 g/l.h) and FFase production (39.39 U/ml). Moreover, cells immobilized in brewer's spent grain presented higher U_t values than the cells immobilized in the other two materials that is very important for elevated FOS production. Such results demonstrated that brewer's spent grain has great potential to be used as immobilization carrier during the FOS and FFase production by *A. japonicus*.